US Army Corps
of Engineers®

LORSS

Lake Okeechobee Regulation Schedule Study

September 2006

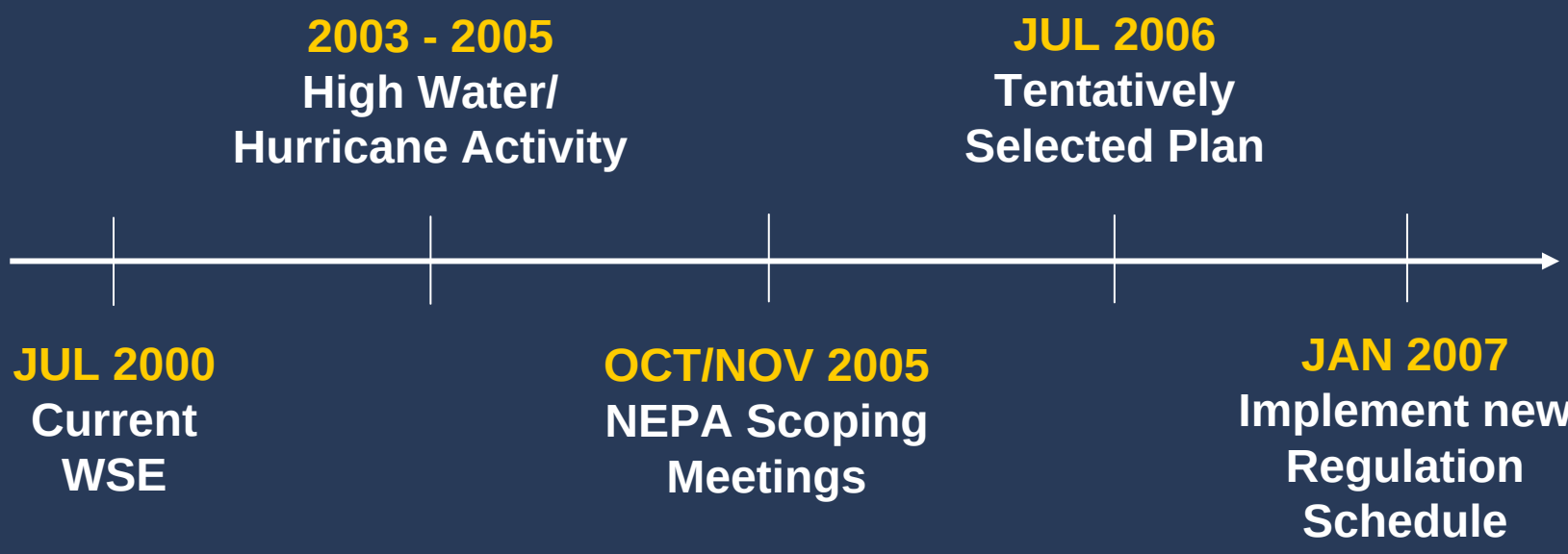
Agenda

- Purpose
- Background
- Study
- Operational Guidelines
- Summary

Purpose

To provide Information and obtain comments on the Draft Supplemental Environmental Impact Statement and the Proposed Revisions to Lake Okeechobee Operational Guidance to be included in the Lake Okeechobee and Everglades Agricultural Area Water Control Plan.

Background


2003 - 2005
High Water/
Hurricane Activity
JUL 2006
Tentatively
Selected Plan
JUL 2000
Current
WSE
OCT/NOV 2005
NEPA Scoping
Meetings
JAN 2007
Implement new
Regulation
Schedule

Study Goals & Objectives

Implement a new Lake Regulation Schedule supported by a Supplemental Environmental Impact Statement by January 2007

Objectives of the new regulation schedule

- Ensure public health and safety
- Manage Lake Okeechobee at lower lake levels
- Reduce high regulatory releases to the estuaries
- Continue to meet Congressionally authorized project purposes

Study Assumptions

- Assumes 2007 condition
- Operational guidelines considered period of record (1913 - 2005)
- SFWMD will provide temporary forward pumps
- SFWMD would lower the Supply Side Management line by one foot

Band 1 CERP Projects and New Lake Schedule

- Corps will initiate new Lake Okeechobee Regulation Study and EIS to capture Acceler8 and other CERP Band 1 projects, and permanent forward pumps, scheduled for implementation in 2010
- Currently proposed LORSS TSP schedule's anticipated period of use is 2007 – 2010

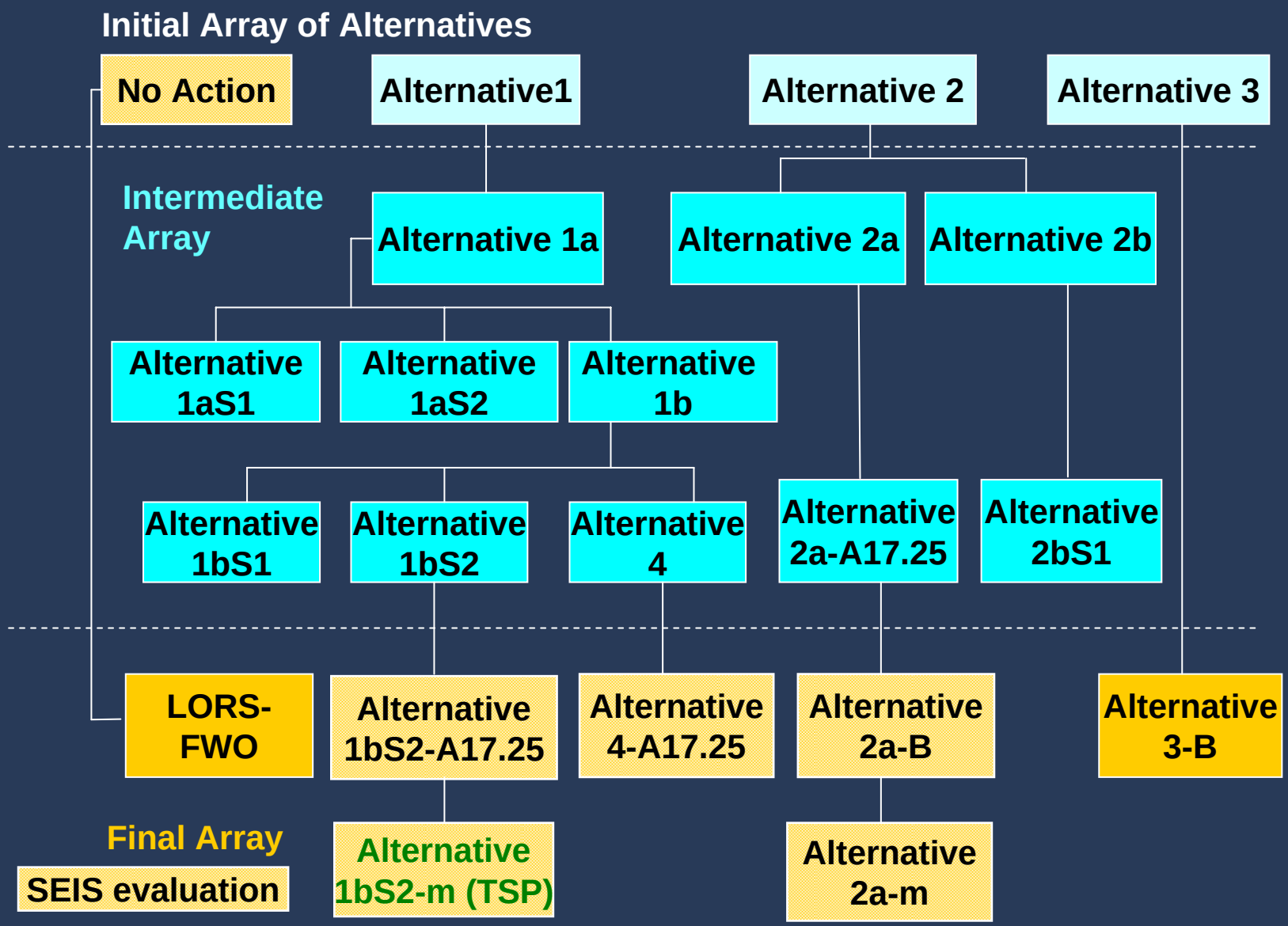
Study Constraints

- Model simulation of record is 36 years (1965 - 2000)
- Herbert Hoover Dike integrity (lake not to exceed 17.25)
- Use of existing infrastructure (no CERP projects)
- Lake Okeechobee constraint on capacity of Stormwater Treatment Areas (64,000 acre-feet annual average)
- Existing regulation schedules for water conservation areas and Kissimmee River chain of lakes

Performance of Alternatives

- Evaluated using SFWMM (2 x 2 Model)
- Evaluated against following performance measures:
  - Flood Control / Public Safety
  - Caloosahatchee Estuary
  - St. Lucie Estuary
  - Lake Okeechobee
  - Water supply
  - Navigation
  - Greater Everglades

Alternatives Evaluated



Tentatively Selected Plan

- Produced the best balance of all objectives
- Allows for quicker response to lake inflows
- Reduces high lake conditions
- Improves optimum flow to the estuaries

National Environmental Policy Act Activities for Draft SEIS

- Formal consultation under the Endangered Species Act was initiated with the US Fish and Wildlife Service in June 2006 for the Everglades Snail Kite, Wood Stork and Okeechobee Gourd
- As a result, USFWS is preparing a Biological Opinion and a Coordination Act Report
- Final SEIS scheduled for release in October-November 2006

Draft SEIS
Summary of Effects

Environmental Factor	*Proposed Action*
Protected Species	May affect some species, i.e. snail kite, wood stork, Okeechobee gourd
Fish and Wildlife Resources	Beneficial effects due to reduced high lake stages; Slight improvements to estuarine conditions through reduced high regulatory releases to St. Lucie Estuary
Historic Properties	No adverse effects

Draft SEIS
Summary of Effects

Environmental Factor	*Proposed Action*
Vegetation	Beneficial effects for submerged aquatic vegetation and emergent vegetation; potential negative effects for spread of invasive exotic vegetation like torpedograss during extreme low lake levels.
Recreation	Improves lake sport fishery
Flood Control	No adverse effects
Water Quality	No adverse effects

Draft SEIS
Summary of Effects

Environmental Factor	*Proposed Action*
Navigation	Adverse effects expected due to increased days below 12.56 feet
Water Supply	No significant adverse effects
Essential Marine Fish Habitat	No significant adverse effects

TSP Operational Guidelines

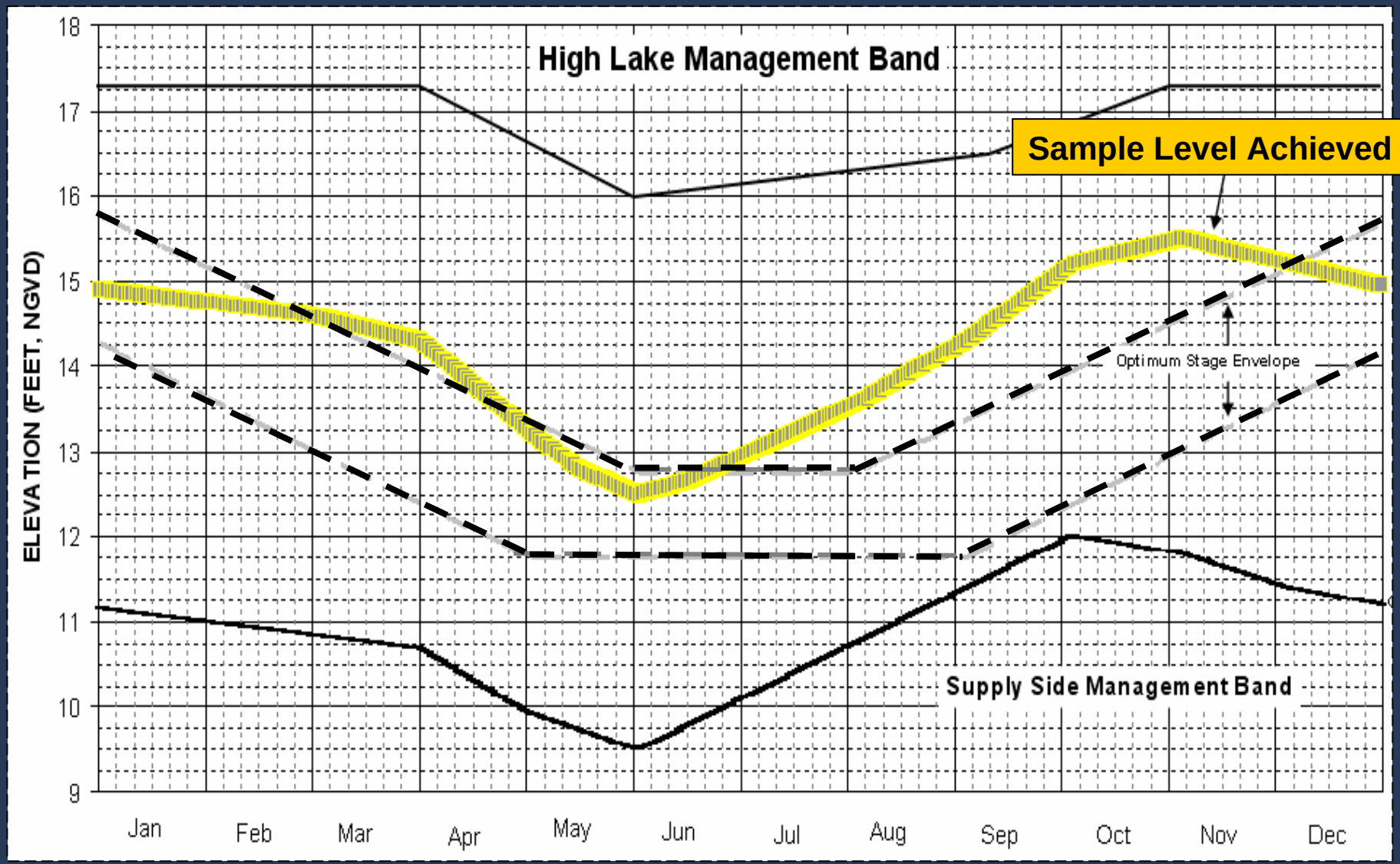
High Lake Management Band: (16.0-17.25) Up to maximum capacity to tide and WCA

Operational Band:

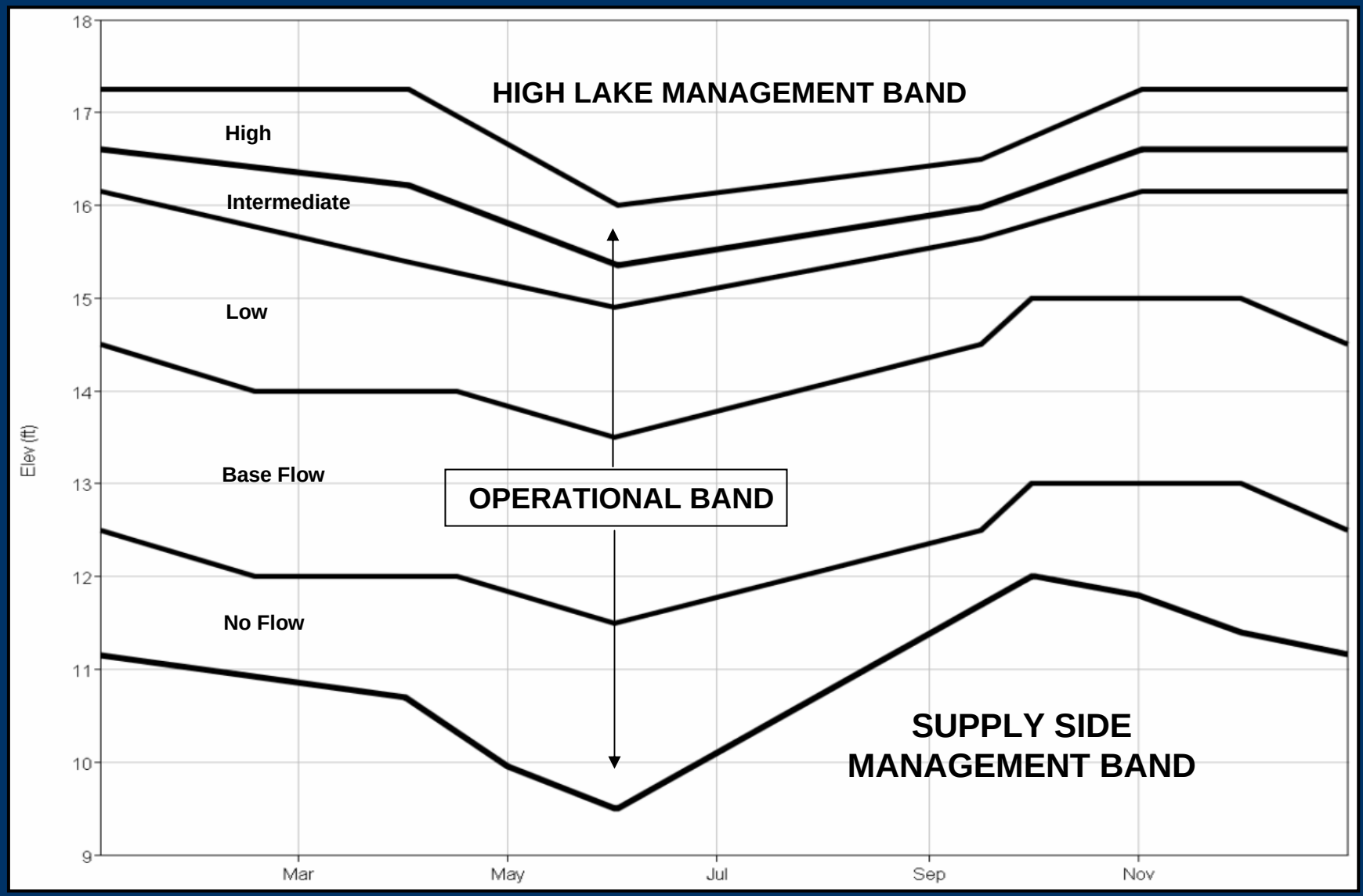
- **High Stage (15.35 - 17.25):** Up to maximum pulse releases to steady flow up to 6,500 cfs at S-77 (*Moore Haven*); 2,800 cfs at S-80 (*St. Lucie*); and, WCA from 0 cfs to max
- **Intermediate Stage (14.90 - 16.60):** From environmental base flow of 450 cfs to the Caloosahatchee Estuary up to 6,500 cfs at S-77; releases from 0 up to 2,800 cfs at S-80; and, WCA from 0 cfs to max
- **Low Stage (13.50 - 16.15):** From no releases to environmental base flow of 450 cfs to the Caloosahatchee Estuary up to 4,500 cfs at S-77; releases from 0 cfs up to 1,800 cfs at S-80; and, WCA from 0 cfs to max
- **Base Flow (11.5–15.0):** From no releases to environmental base flow of 450 cfs to the Caloosahatchee Estuary. Including water supply demands

Supply Side Management Band: SFWMD water supply releases

TSP Regulation Schedule



Lake Management Intermediate Zones



Lake Okeechobee Operational Guidance

Part 2: Establish Allowable Lake Okeechobee Releases to Tide (Estuaries)

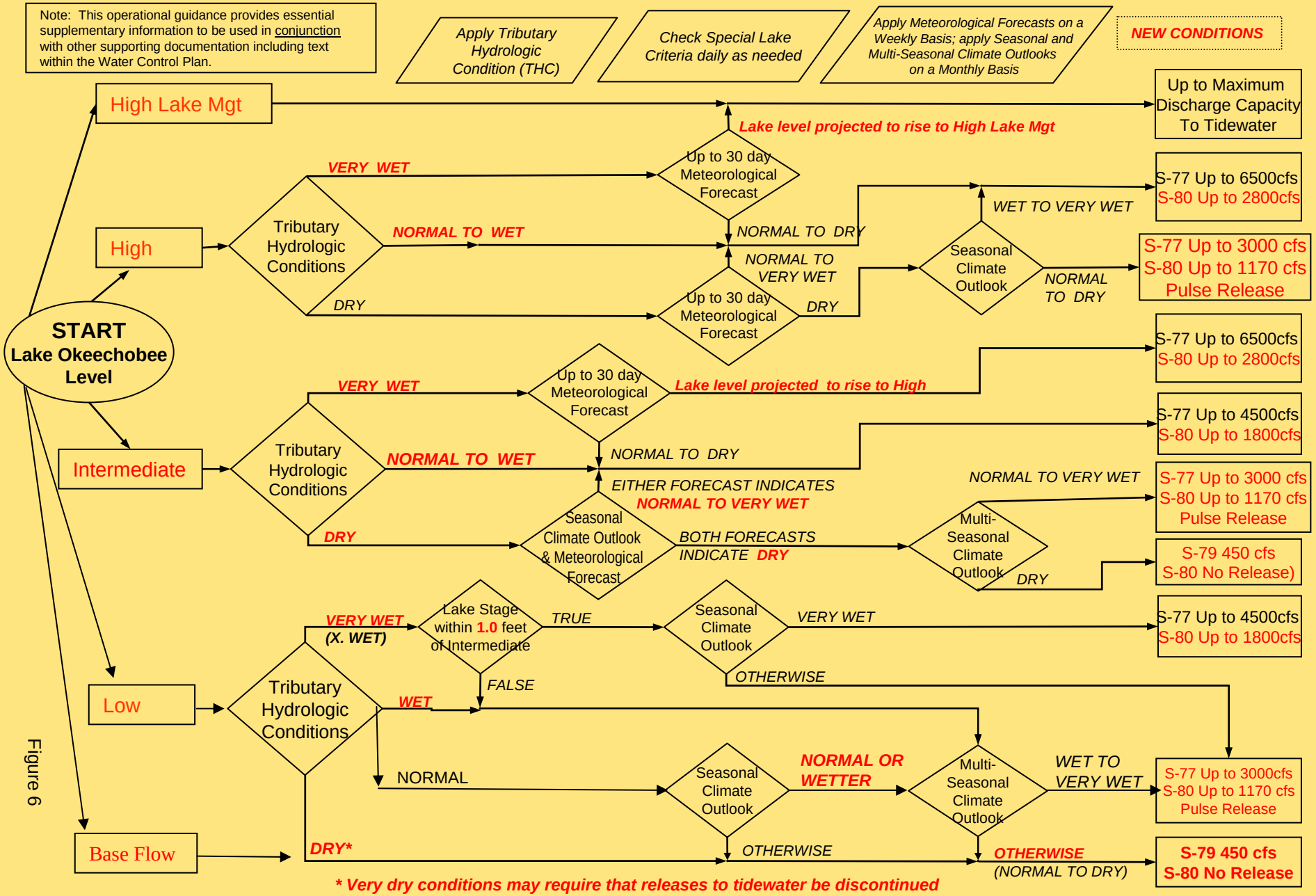
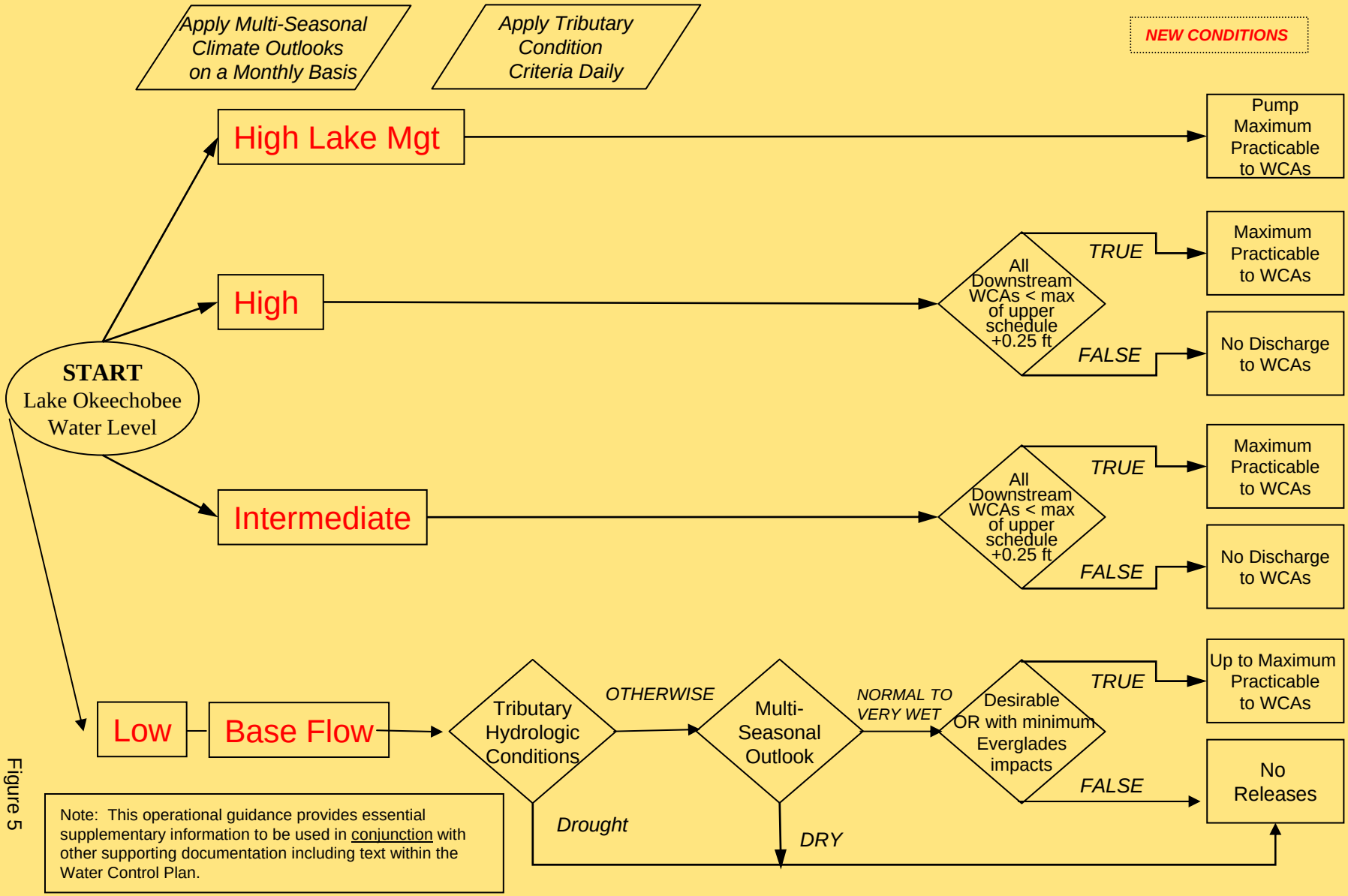


Figure 6

Lake Okeechobee Operational Guidance

Part 1: Establish Allowable Lake Okeechobee Releases to the Water Conservation Areas



Note: This operational guidance provides essential supplementary information to be used in conjunction with other supporting documentation including text within the Water Control Plan.

Figure 5

Definition of Tributary conditions based on the Palmer Index and Net Inflow

Tributary Hydrologic Classification	Palmer Index Class Limits	2-wk mean L.O. Net Inflow Class Limits
Very Wet	3.0 or greater	Greater >= 6000 cfs
Wet	1.5 to 2.99	2500-5999 cfs
Near Normal	-1.49 to 1.49	500-2499 cfs
Moderate Drought Dry	-1.5 to -2.99	-5000 – 500 cfs
Severe Drought Very Dry*	-3.0 or less	Less than -5000 cfs

The wettest of the two indicators describes the current tributary condition
* For modeling purposes, the dry and very dry classes can be combined into one class

The Net Inflow is represented by NI = RF – ET + Inflows, where RF = rainfall over the lake, ET = lake evapotranspiration, and Inflows = all inflows to the Lake.
Using the basic mass balance equation, the Net Inflow can be calculated by NI = DS + Outflows, where DS = storage change, and Outflows = measured outflows
The Palmer Index is a meteorological index that responds to weather conditions that have been abnormally dry or abnormally wet. The index is calculated based on precipitation and temperature data, as well as the local available water content of the soil.
Discussion on Palmer Index: http://www.drought.unl.edu/whatis/indices.htm#pdsi
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/cdus/palmer_drought/wpdanote.shtml
Current Conditions:http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/regional_monitoring/palmer.gif

Table 1

Non-typical Temporary Operations Bands

*(To include water supply demand releases)

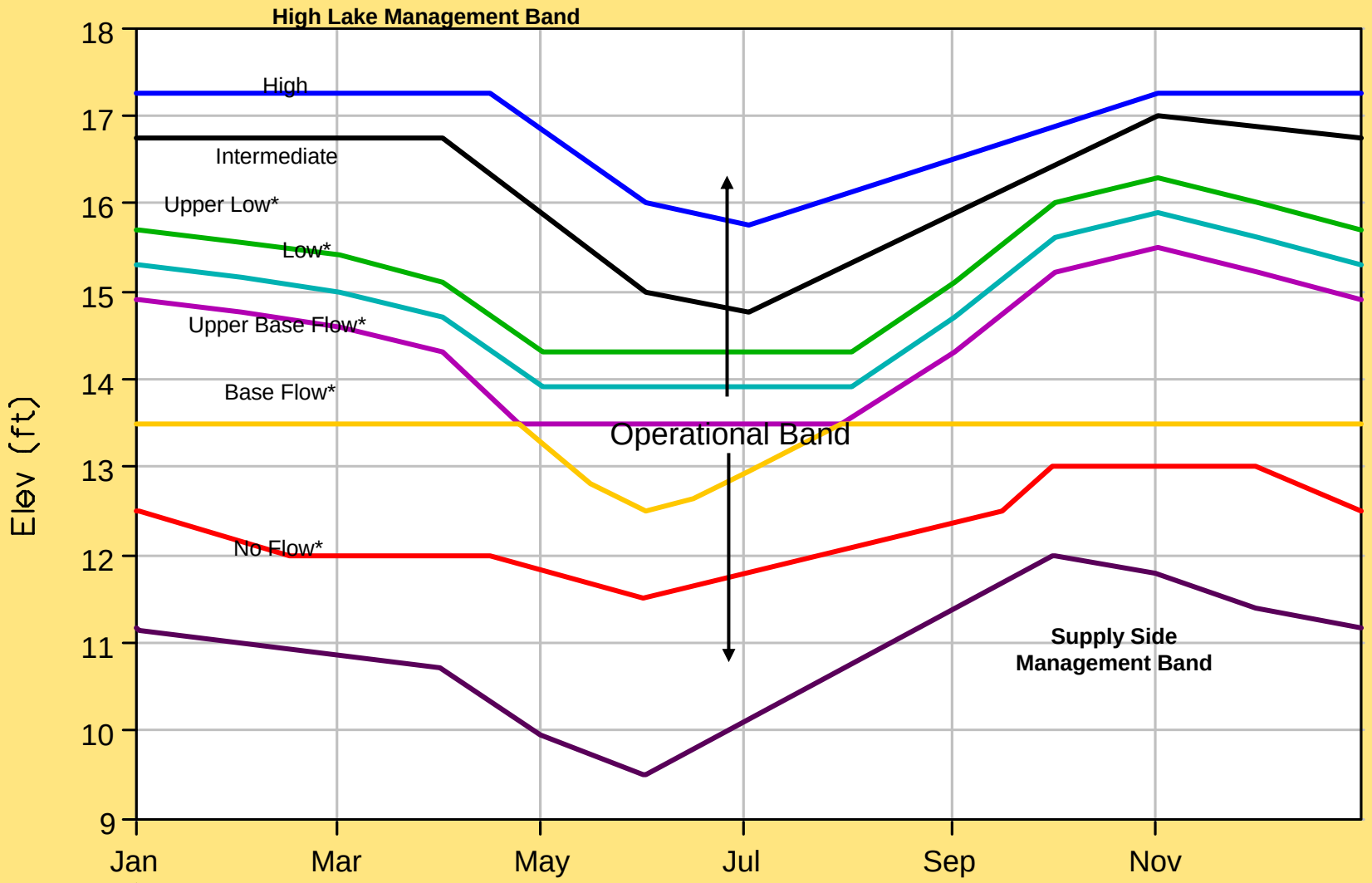


Figure 8

Lake Okeechobee Operational Guidance

Part 3: Establish Allowable Lake Okeechobee Releases to Tide (Estuaries)

Note: This operational guidance provide essential supplementary information to be used in conjunction with other supporting documentation.

Apply Tributary Hydrologic Condition (THC)

Check Special Lake Criteria daily as needed For Active Hurricane

Apply Meteorological Forecasts on a Weekly Basis; apply Seasonal and Multi-Seasonal Climate Outlooks on a Monthly Basis

**Projected to rise box is defined as: Projected to rise to the higher band Without any additional releases Greater than the false release amount*

START Lake Okeechobee Level

High Lake Mgt. → Up to Maximum Discharge Capacity To Tidewater

High → THC
- *Very Wet* → **Projected to rise into High Lake Mgt.*
- *Otherwise* → **Projected to rise into High Lake Mgt.*

**Projected to rise into High Lake Mgt.*
- *True* → Up to Maximum Discharge Capacity To Tidewater
- *False* → S-77 Up to 7500 cfs S-80 Up to 5000 cfs

Intermediate → THC
- *Very Wet* → **Projected to rise into High*
- *Otherwise* → **Projected to rise into High*

**Projected to rise into High*
- *True* → S-77 Up to 3500cfs S-80 Up to 2000cfs Pulse
- *False* → S-77 Up to 3500cfs S-80 Up to 2000cfs Pulse

Upper Low → THC
- *Very Wet* → **Projected to rise into Intermediate*
- *Wet to Normal* → **Projected to rise into Intermediate*
- *Very Dry* → S-77 Up to 1600 cfs S-80 Up to 800 cfs Pulse

**Projected to rise into Intermediate*
- *True* → S-77 Up to 2300 cfs S-80 Up to 1400 cfs Pulse
- *False* → S-77 Up to 2300 cfs S-80 Up to 1400 cfs Pulse

Low → THC
- *Very Wet* → Lake Stage within .5 feet of Intermediate
- *Otherwise* → **Projected to rise into Upper Low*

Lake Stage within .5 feet of Intermediate
- *True* → **Projected to rise into Upper Low*
- *False* → **Projected to rise into Upper Low*

**Projected to rise into Upper Low*
- *True* → S-77 Up to 2300 cfs S-80 Up to 1400 cfs Pulse
- *False* → S-77 Up to 1600 cfs S-80 Up to 800 cfs Pulse

Upper Base Flow → **Projected to rise into Low*

**Projected to rise into Low*
- *True* → **Projected to rise into Upper Base Flow*
- *False* → S-79 Up to 800cfs S-80 Up to 400 cfs Pulse

Base Flow → **Projected to rise into Upper Base Flow*

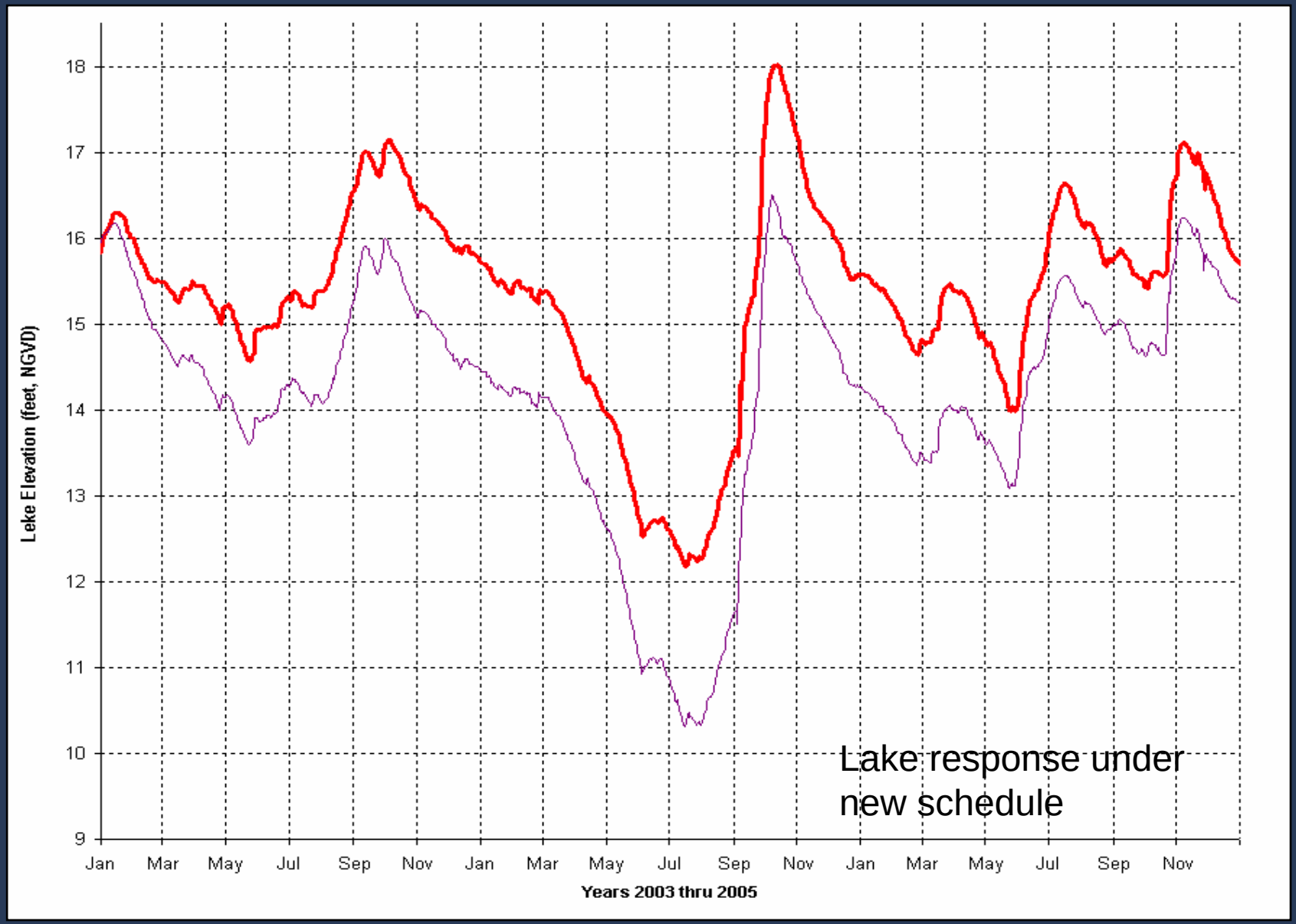
**Projected to rise into Upper Base Flow*
- *True* → **Projected to rise into Low*
- *False* → S-79 Up to 450 cfs

No Flow → No Release

Very dry conditions may require that releases to tidewater be discontinued

Figure 8

Actual 2003-2005 —— TSP ——



NEPA Requirements for Agencies and Public Review of Draft SEIS

- Provided draft SEIS to Federal, State and local agencies, Native American Tribes, private organizations, and interested parties
- Notice of Availability of Draft SEIS published in the Federal Register August 18, 2006
- 45-day public comment period on Draft SEIS ends October 2, 2006

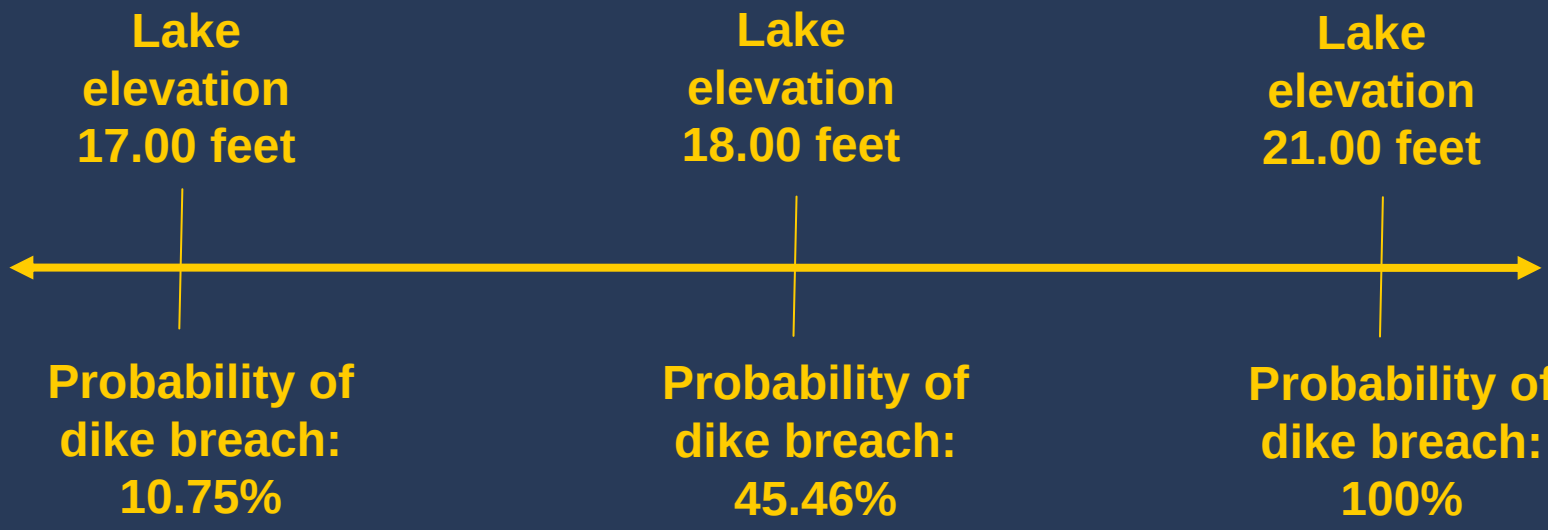
NEPA-Required Public Comment Period

- Corps conducted a series of public workshops in July 2006 on the proposed TSP prior to release of draft SEIS
- Out of those workshops, public comments were received on the TSP
- Draft SEIS was released to the public for review and comment Aug 18
- Corps is currently receiving public comments on the draft SEIS during public review period (thru Oct 2, 2006)
- The following slides address some of the comments received to date

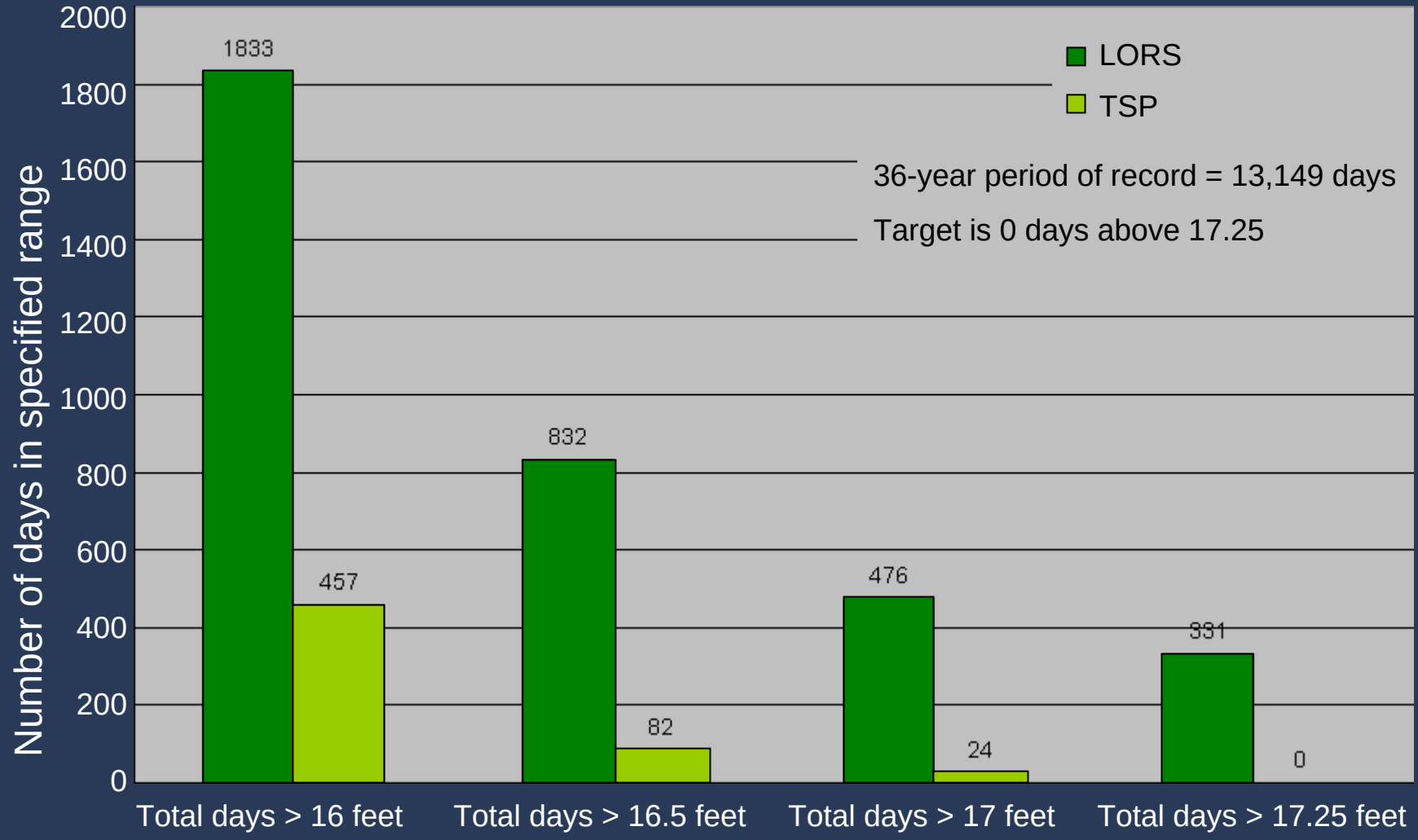
High Lake Constraint of 17.25

High lake constraint of 17.25 feet was based on

- Corps' Herbert Hoover Dike Major Rehabilitation Report (1998) that stated the probability of dike failure increases with increasing lake elevation
- Governor Bush's letter to the Corps to reduce Lake Okeechobee water levels by 2.0 feet



High Lake Stages

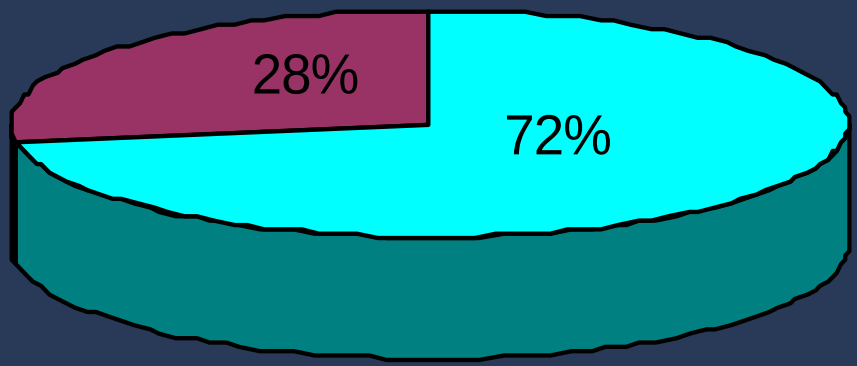


Caloosahatchee Estuary Inflow

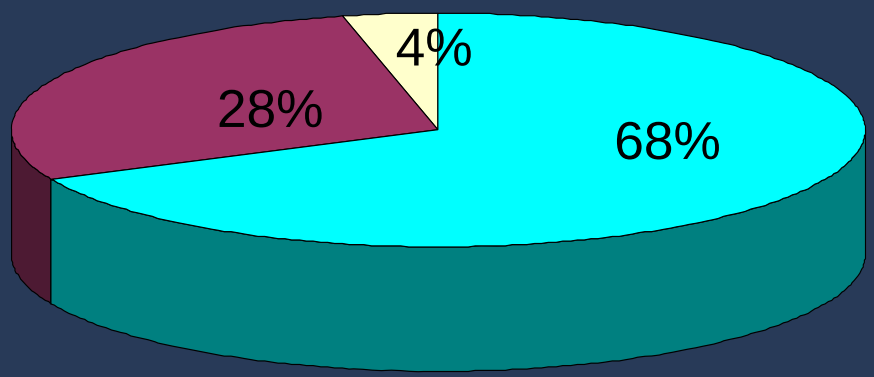
Average Annual for Period of Record

- Caloosahatchee Basin runoff
- Lake Okeechobee releases
- Estuary base flow releases

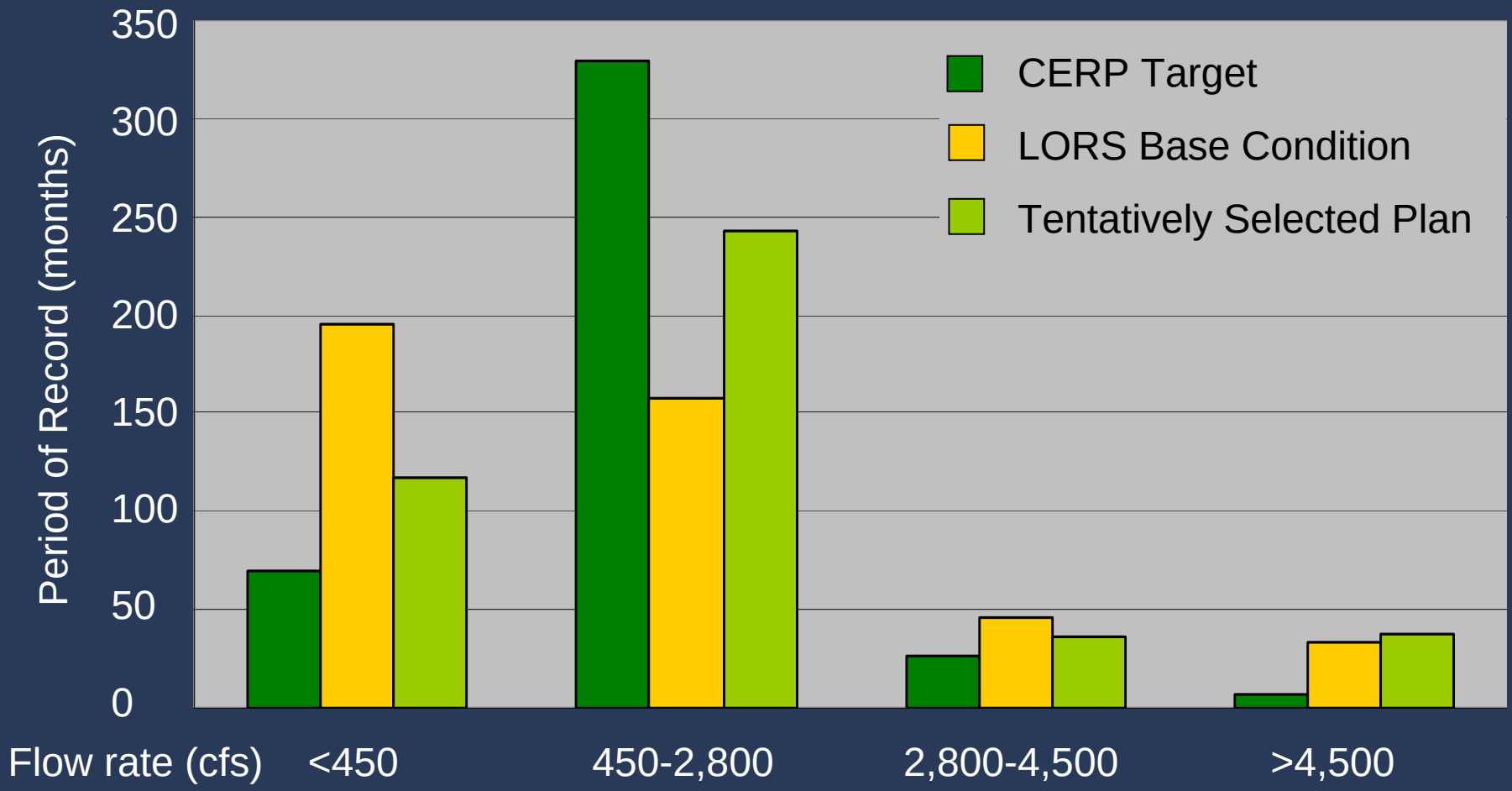
LORS



TSP



Caloosahatchee Estuary



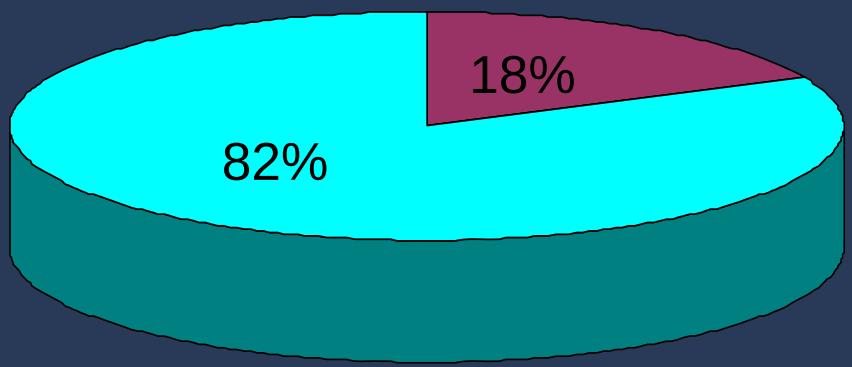
TSP Improved High Flows Greater than 2800 cfs by 7 months overall

St Lucie Estuary Inflow

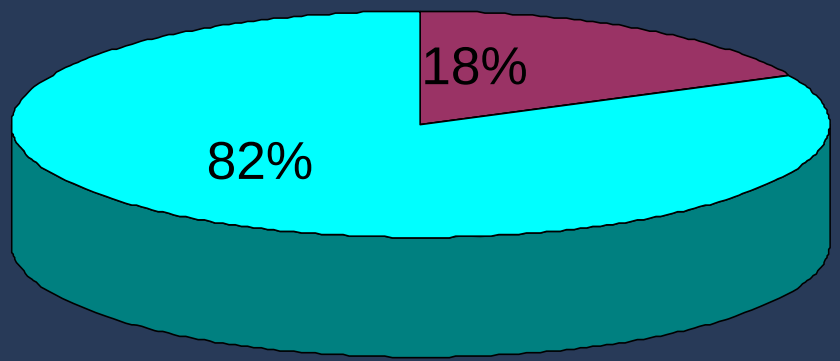
Average Annual for Period of Record

- St. Lucie Basin / Tributary Inflow runoff
- Lake Okeechobee releases

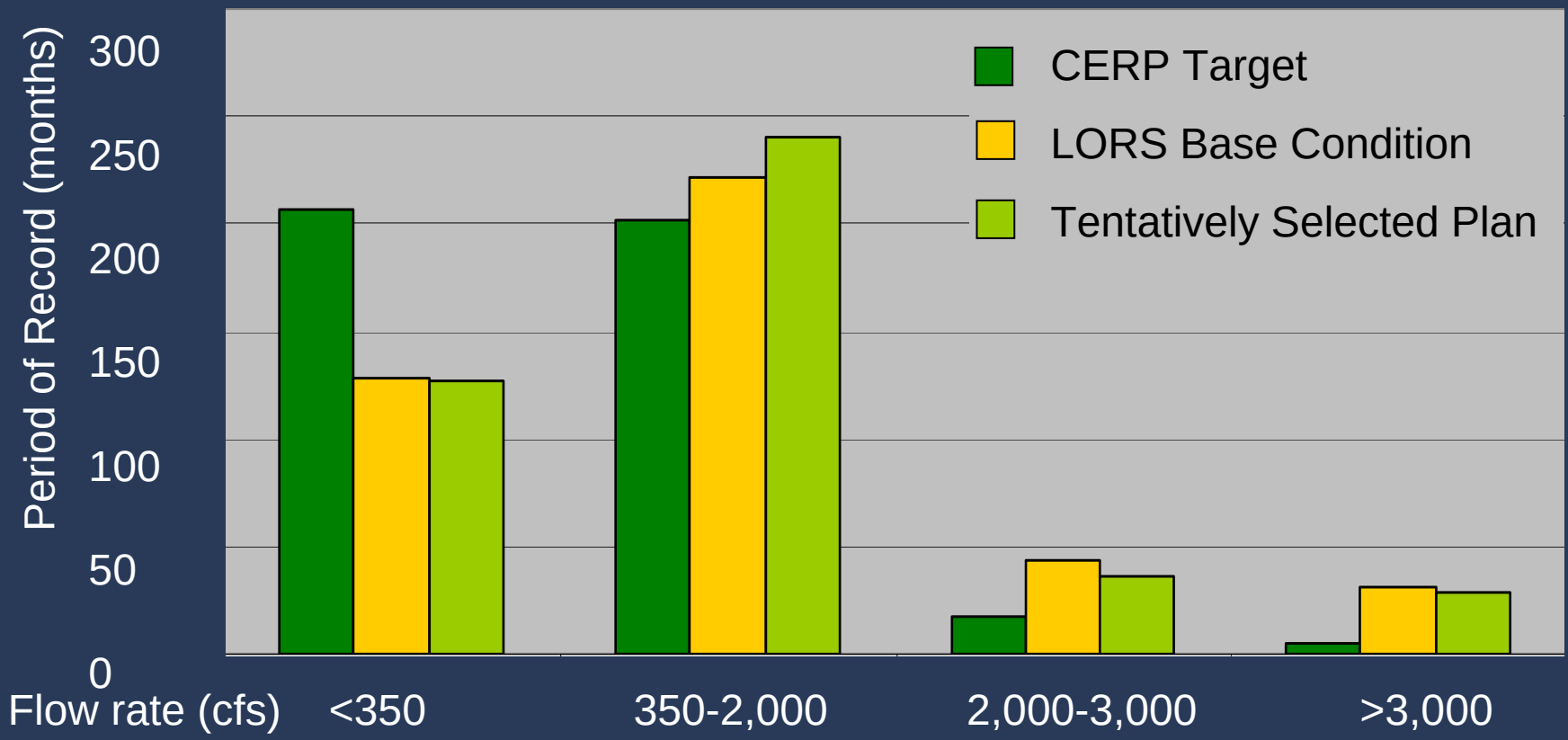
LORS



TSP



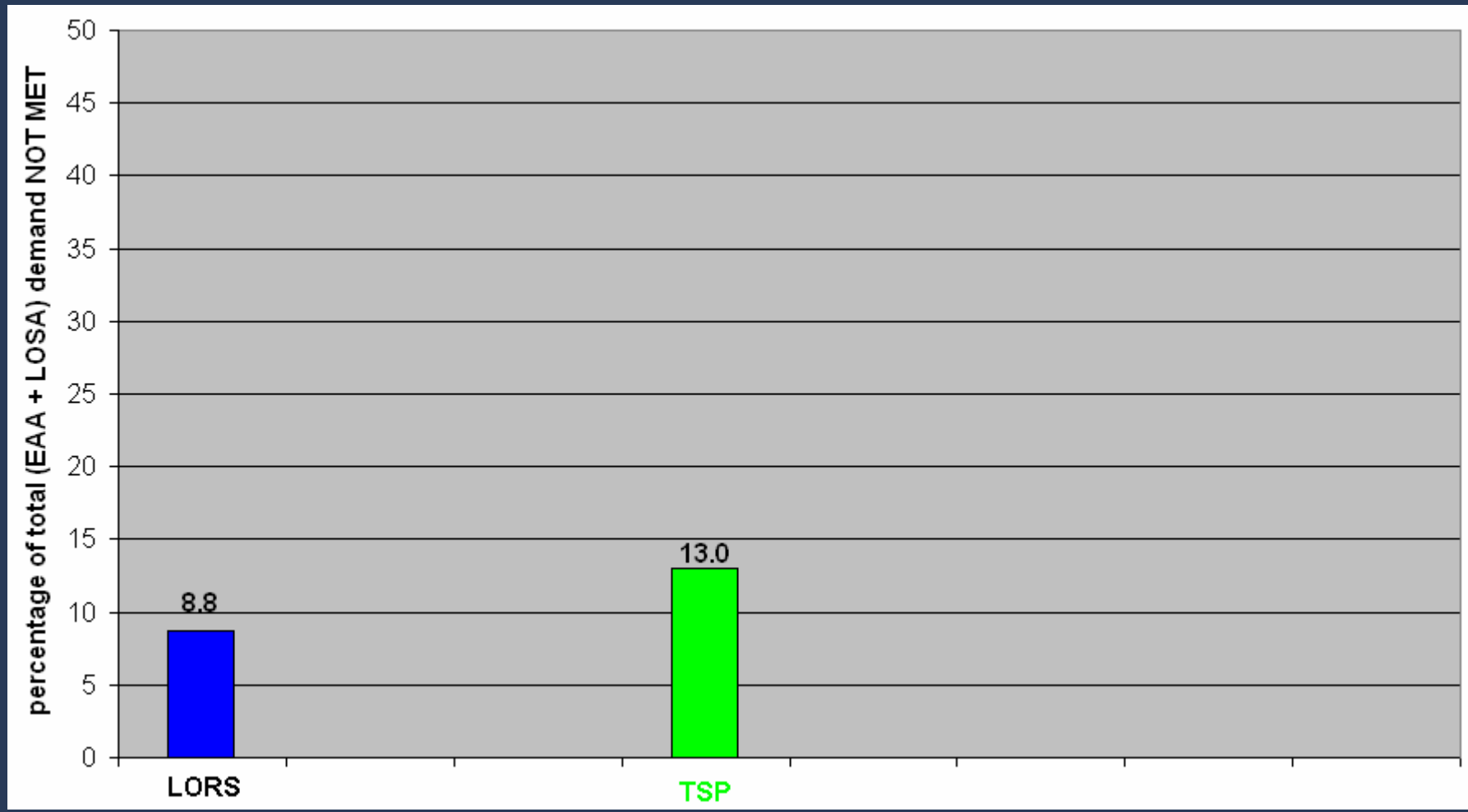
St Lucie Estuary



TSP Improved High Flows Greater than 2000 cfs by 10 months overall

Water Supply

Mean annual EAA and LOSA Supplemental Irrigation: Demands not met from 1965-2000 for drought years 1971, 1975, 1981, 1985 and 1989



Milestone Schedule

DWCP - Draft Water Control Plan
DSEIS - Draft Supplemental Environmental Impact Statement
WCP - Water Control Plan
SEIS - Supplemental Environmental Impact Statement
CAR - Coordination Act Report - Fish and Wildlife Service
SAD - South Atlantic Division

Public Coordination

- 45-day public comment period for draft SEIS and WCP, Aug 18 – Oct 2
- Regional public meetings
- 30-day public comment period for final SEIS and WCP, Nov 30 – Dec 30 2006

Public Comments

Jacksonville District website
www.saj.usace.army.mil

Contact: Yvonne L. Haberer
LORSSComments@saj02.usace.army.mil

U.S. Army Corps of Engineers
Jacksonville District
701 San Marco Blvd.
Jacksonville, FL 32207-8175

Comments

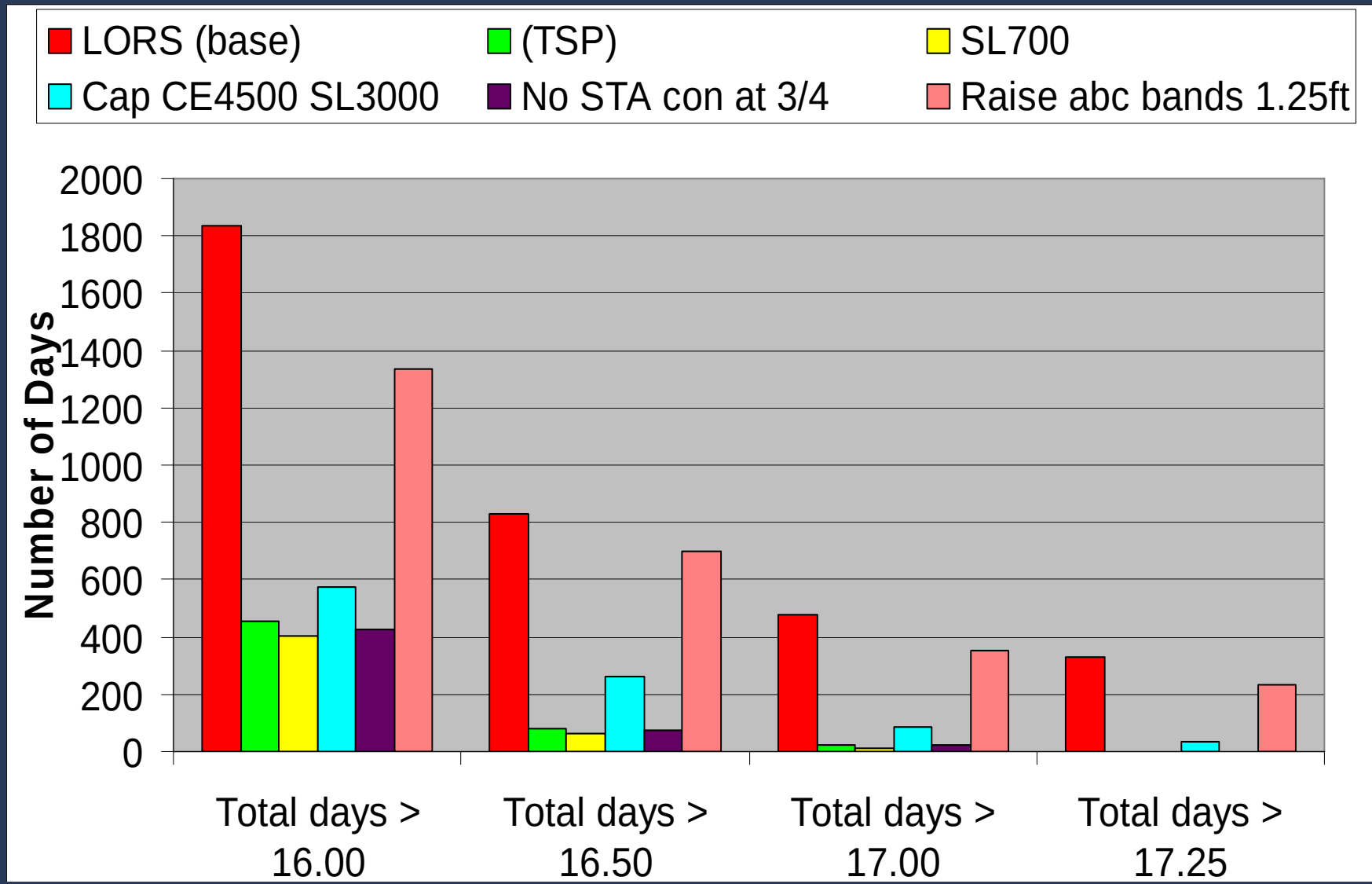
The following slides are regional specific and in response to questions about the tentatively selected plan

TSP SENSITIVITY ANALYSIS REQUESTS

- Adjust 17.25 constraint
- Utilization of SFWMD Lands for Storage
- Introduce Base Flow to St. Lucie Estuary
- Introduce sliding scale base flow to Caloosahatchee Estuary
- Adjust Operational Bands and Releases

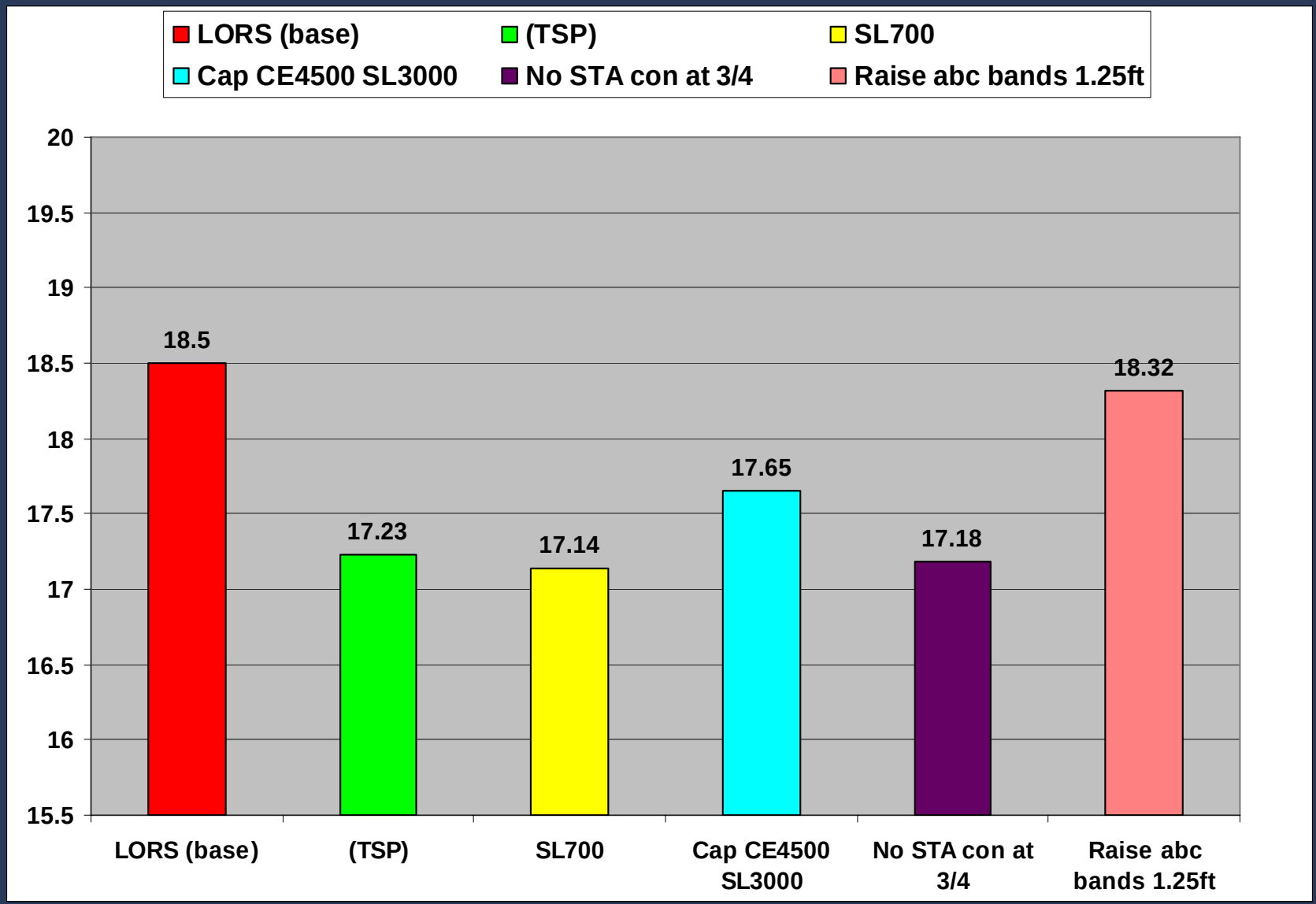
High Lake Stages

Sensitivity Analysis

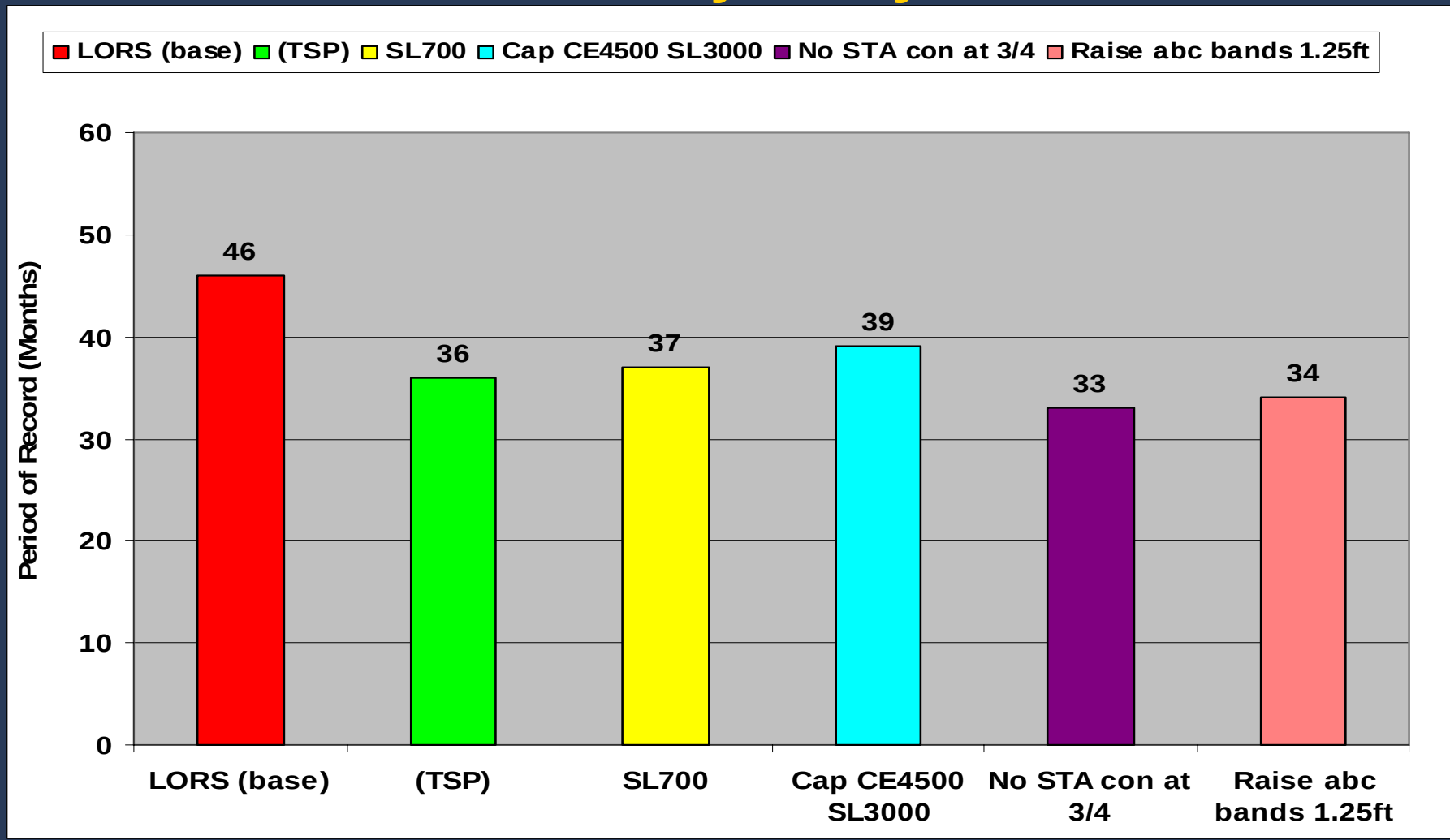


Peak Lake Stage

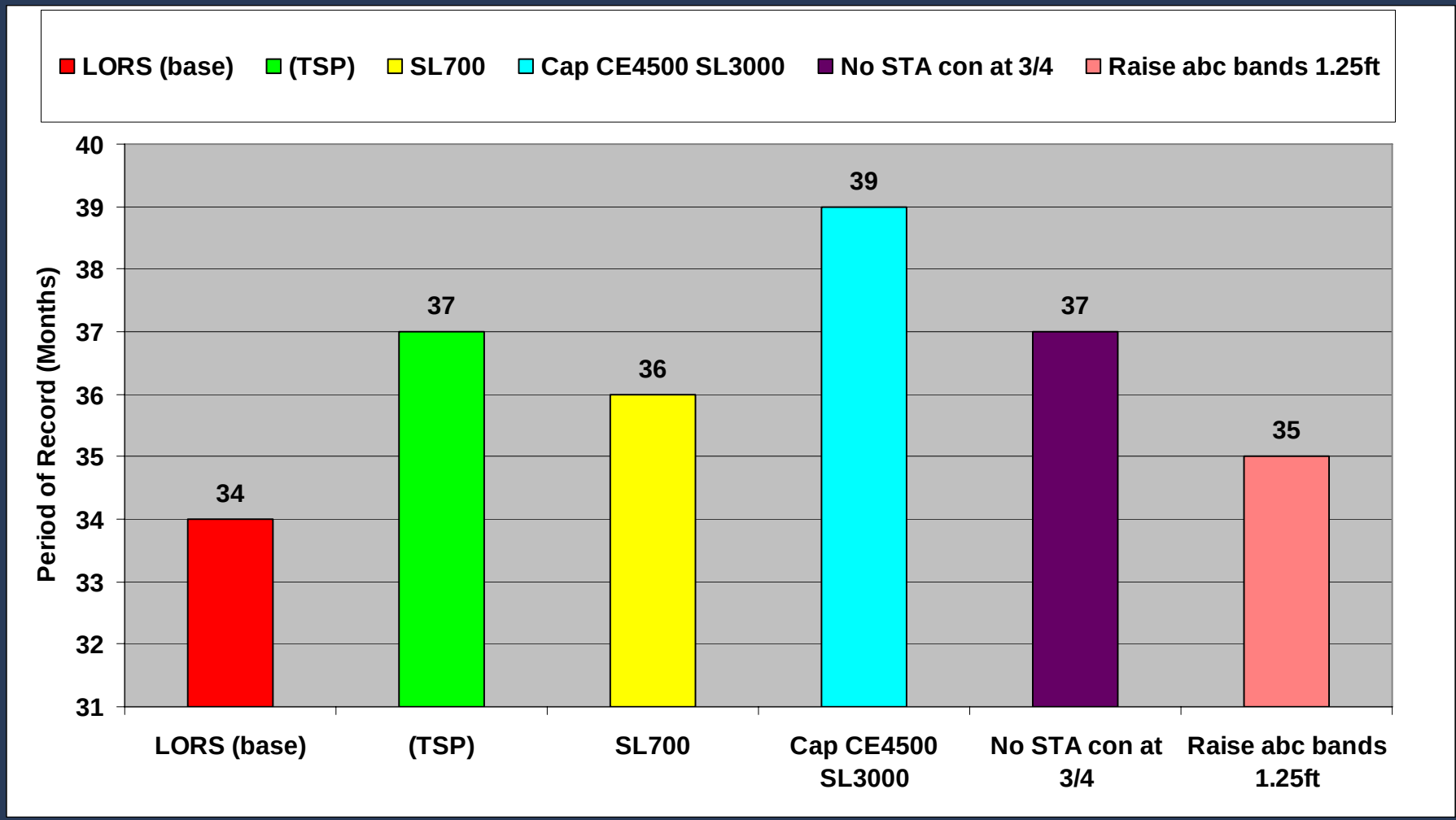
Sensitivity Analysis



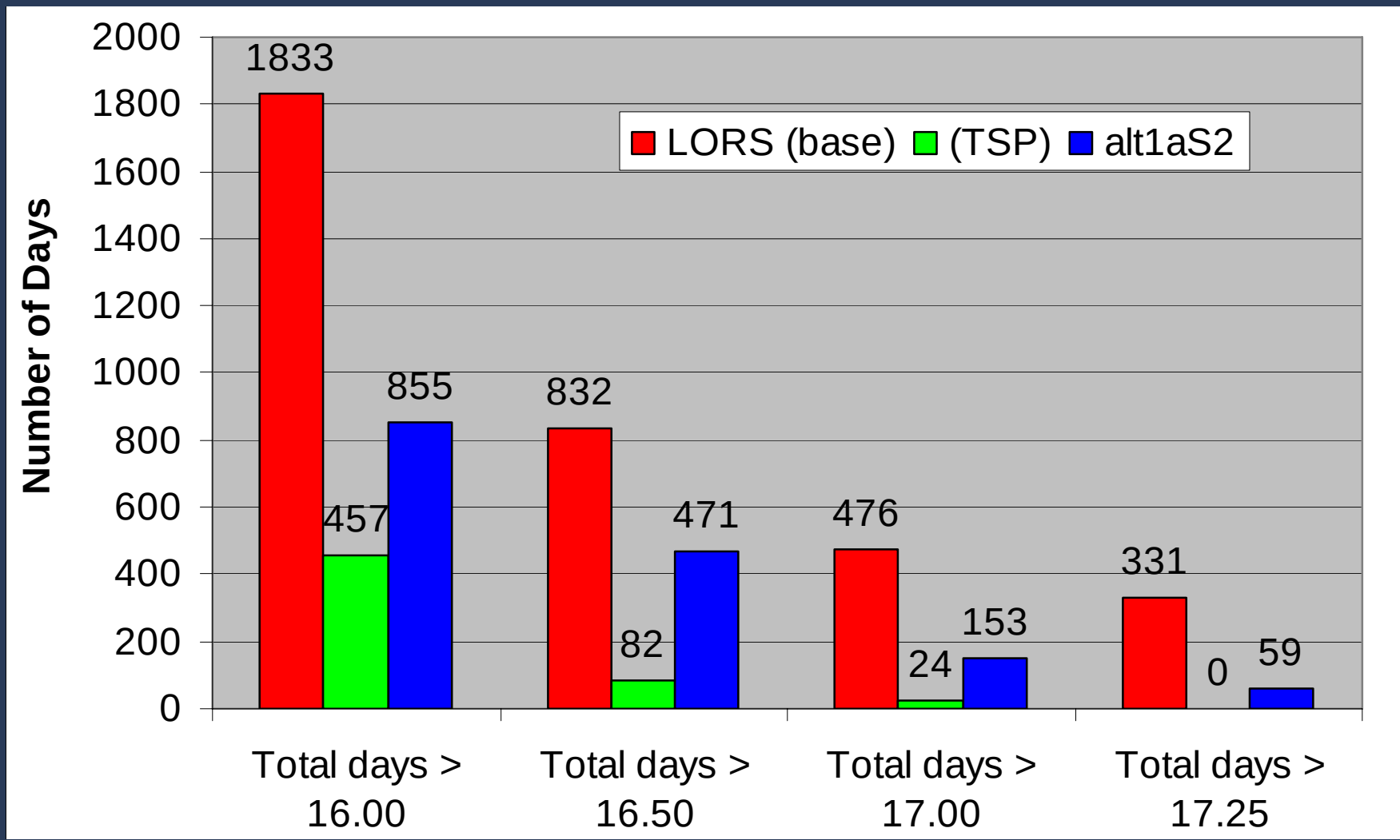
Caloosahatchee Estuary:
Flow Rates 2800 cfs to 4500 cfs
Sensitivity Analysis



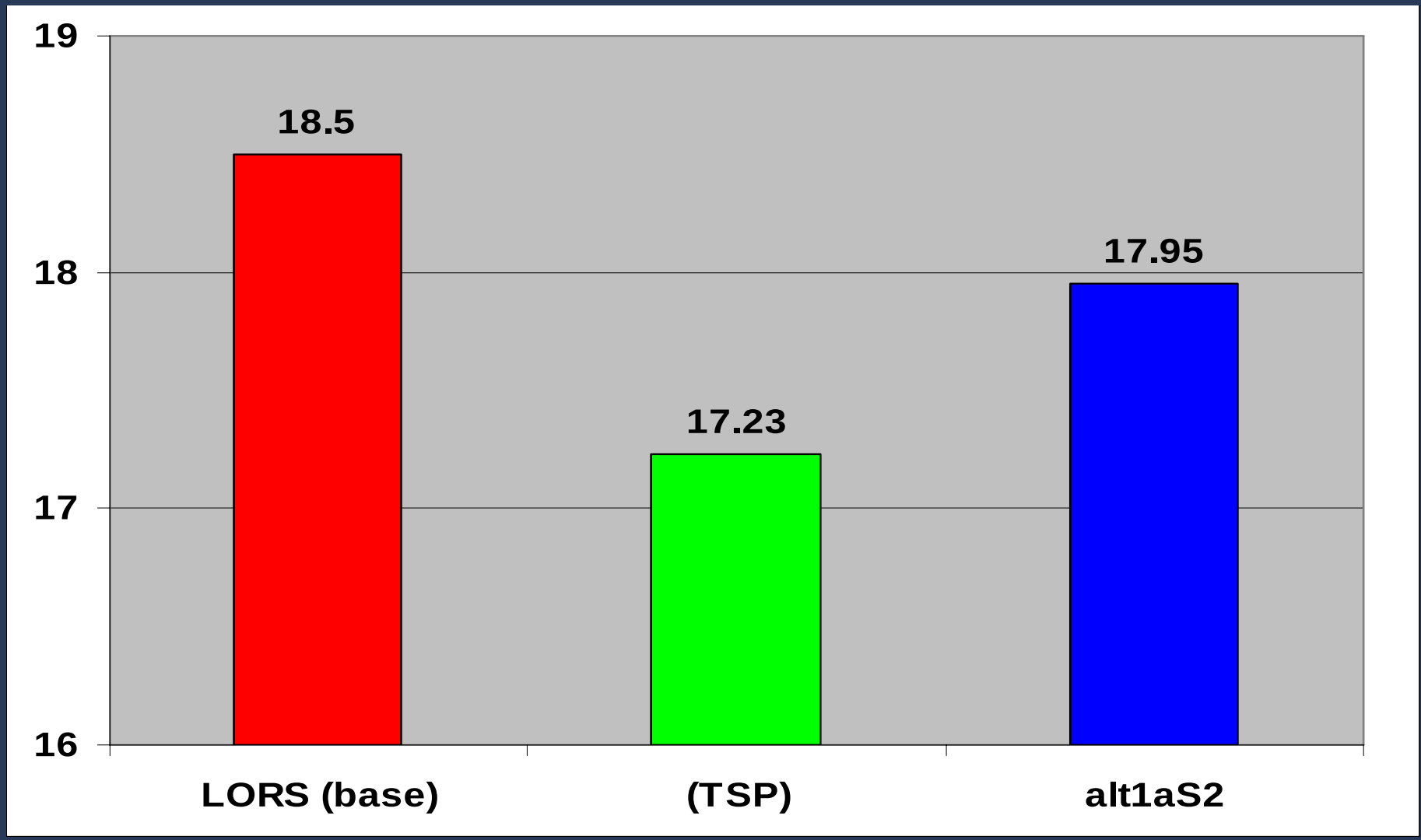
Caloosahatchee Estuary
Flow Rates > 4500 cfs
Sensitivity Analysis



High Lake Stage
TSP and 1aS2 Comparison

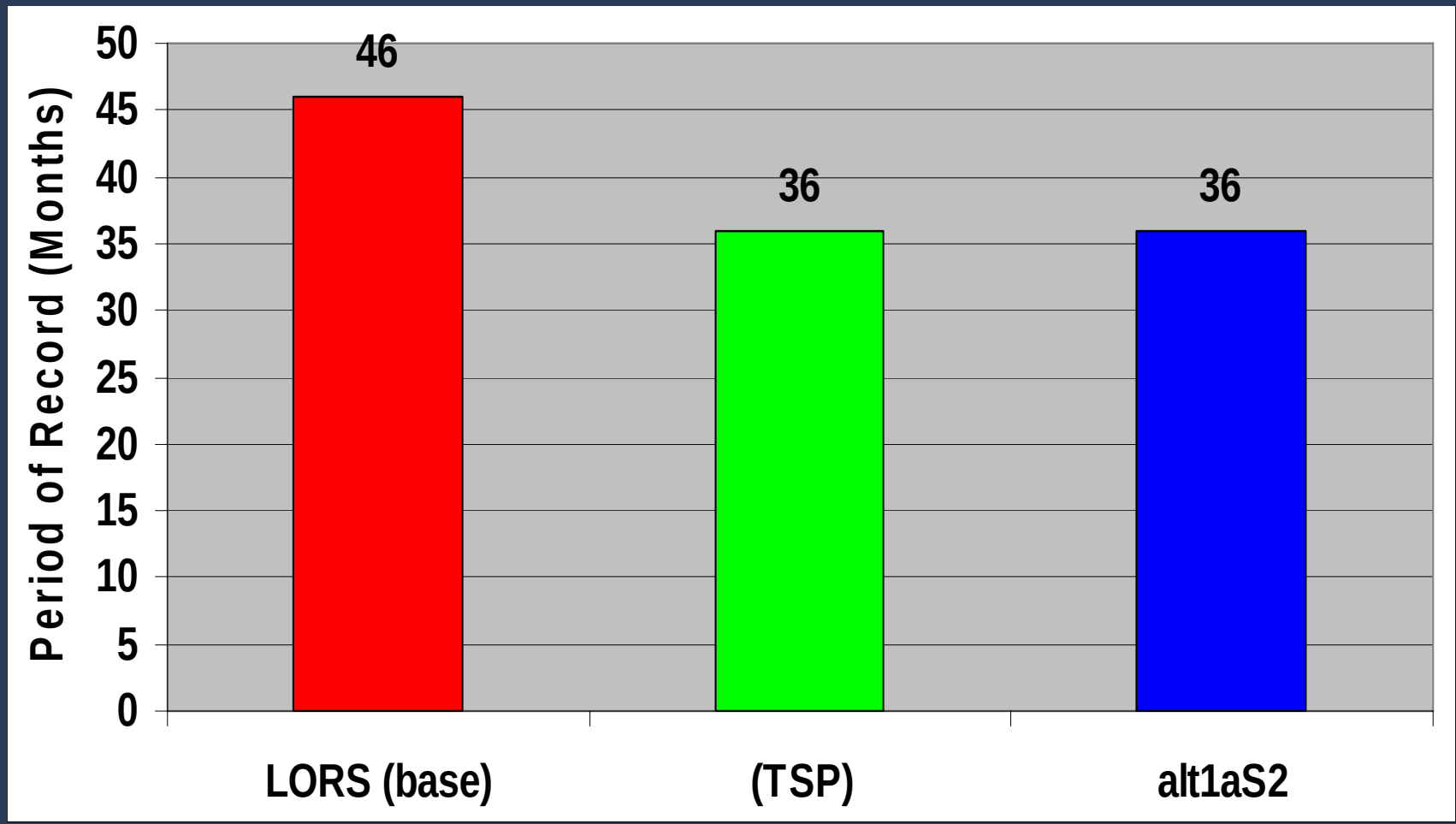


Peak Lake Stage
TSP and 1aS2 Comparison



Caloosahatchee Estuary TSP and 1aS2 Comparison

Flow Rates 2800 cfs to 4500 cfs



Caloosahatchee Estuary TSP and 1aS2 Comparison

Flow Rates > 4500 cfs